Reassessing The U.S. Agricultural Policy in World Agricultural Trade: Conceptual Framework

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Abstract

A conceptual framework of the world trade with endogenous exchange rate is constructed. Monetary policy, asset, and loan rate are illustrated. Current U.S. farm loan policy may be in the right direction but may not effectively improve exports. The future market share would depend on the opportunity costs in both economies.

Schuh (1974) has called attention to the effects of the relative price of currencies on the agricultural sector. Since then, at least four approaches have been studied separately.[1] Resulting controversies and agreements have led to the need for further understanding of the U.S. role in world agricultural trade. However, the substantive understanding about the role of economic policies, trade or agricultural policies, in the world market remains limited. The whole picture of world agricultural trade has not yet been constructed.

Studies made in late 1960's and 1970's treat the exchange rate as exogenous and use partial equilibrium analysis. Tweeten (1967) and Johnson (1977) estimate the weighted aggregate demand for U.S. product. Some studies use the balance of trade analysis such as Houthakker and Magee (1969), Clark (1974), Hooper (1974), and Hooper and Wilson (1974). The endogeneity of the exports remain important in the late 1970's. However, those researches cannot fully explain the substantive trade problems. In the early 1980's, studies move to the consideration of the general equilibrium macroeconomic models. Chambers and Just (1981, 1982) look at the dynamic nature of the effects of the exchange rate on agriculture and the monetary factors affecting exports. Considering only the domestic macroeconomic factors, Canler and Pagoulatos (1983) suggest that money supply and the aggregate real income are two very important factors in determining the exchange rate. Collins, Meyers, and Bredahl (1980) take a view on the effects of major shocks domestic and abroad on the U.S. exports. The exchange rate change has the smallest impact on prices under free trade assumption.[2] Orden (1984) concedes that

the effects of exchange rate change on agriculture would be overstated when the exchange rate is the only macroeconomic factor in his two-country world trade model.

This paper presents an alternative approach to the world agricultural trade. Not only the exchange rates but the policies on the real and the financial sectors within each country are linked together. Implications for real world agricultural trade policies are conceptually explored.

Illustrations

Figure 1 illustrates the effects in the international trade of an over-valuation of the U.S. dollar. It is assumed that there are two big countries, U.S. and ROW, and one commodity in the world market. If there are no transaction costs, the flow of the commodity in international trade would be determined through the comparative advantages of production in both economies. In the U.S., the initial equilibrium price, P_a, and quantity, Q_a, are determined from the intersection of the aggregate supply, S_a, and the aggregate demand, D_a. In the ROW, the intersection of the aggregate supply, S_r, and the aggregate demand, D_r, determines the initial equilibrium price, P_r, and quantity, Q_r. It is assumed that the U.S. production of the commodity has the comparative advantage over the ROW production, i.e. $P_a < P_r$.[3] Thus, the excess supply curve, ES_a, is derived from the U.S. and the excess demand curve, ID_r, is derived from the ROW. Once trade has been opened up between the two countries, the world market clearing price is P_w and the traded amount is OU. Assuming that the exchange rate of the U.S. currency relative to the ROW

currency is normalized as 1 in equilibrium, there is only one price faced by the U.S. and the ROW after trade, i.e. $G=P_w=Z$.[4] Thus, the U.S. faces a price increase and the ROW faces a price decrease. However, the exchange rate is not always in equilibrium under the fixed or managed floating exchange rates.[5] The exchange rate may be in equilibrium under floating system if the economies are full employment and perfect price movement. The effect would be shared by both countries in terms of the relative value of the currencies. Thus, the U.S. confronts a lower price, G', than the world price, G, and the ROW confronts a higher price, Z', than the world price, Z. It is also assumed that the world market clearing price does not change without the changes of the real sector in either country.[6] The discrepancies between G and G' and between Z and Z' depend on where the exchange rate stands. As a result, the amount traded in the world shrinks to OU' in the world market. Consumption in the U.S. and the ROW production are increased and the U.S. production and the ROW consumption are decreased. In the world market, the change on the traded amount due to the over-valuation can be viewed as the rotations in ES_d and ID_f. This implies that the real exchange rate may be important in determining the elasticities of import demand and export supply functions.

In the U.S., the target price and loan rate policies affect the export supply function. Figure 2 illustrates the effects of the target price policy and the dollar over-valuation on international trade. It is assumed that the U.S. target price is set at P Which determines the output at OF When prices faced by producers are lower than P_m, the producers still produce OF_m

because P_m is the guaranteed minimum price. The supply curve in the U.S. becomes S_dKF_m. The export supply curve in the world market becomes $YXES_d$ which intersects the import demand curve at a lower world market equilibrium price, P_w'. As a result, the amount traded is increased from OU to OU_m in the world market. The consumers in both the U.S. and ROW benefit from a decrease in world market price and the ROW producers decrease the production. In order to keep the world price constant, the U.S. has to put UU_m amount of grain in domestic reserve. If the over-valuation is accompanied with the target price policy, the amount traded will be reduced and may not change much from OU in the world market. It is obvious that production in the U.S. remains at OF_m because P_m is the price assured domestically for the producers. The over-valuation improves the U.S. consumption from OH_m to OH_m', and the ROW production from OJ_m to OJ_m'. The ROW consumption is depressed from OM_m to OM_m'. In the world market, the export supply curve become even steeper in addition to the kink. The import demand curve becomes less elastic relative to ID_r in order to keep the new world market clearing price, P_w', from changing.

Instead of the argument on free trade, the role of financial or asset markets become important in the discussion. Figure 3 illustrates the effects in international trade of a devaluation after the over-valuation accompanied with a short-run holding in asset investment in the rest of the world. Following from Figure 1, U.S. faces price G' and the ROW faces price Z'with the over-valuation of the U.S. dollar. It is assumed that there was a long enough time of over-valuation which stimulates the asset investments in the ROW from S_r to S_r'. It is pretended that U.S.

does not observe the situation clearly. Thus, the U.S. is expecting a price reduction from Z' to Z in the ROW by using a devaluation of the U.S. dollar. It means that the quantity produced by the ROW is expected to reduce from OJ' to OJ. However, the effect of a devaluation on the production would be the movement from point c to d on $S_{F'}$ but not from b to a on S_F if there is a short-run holding of asset investments in the ROW. To the extent, the short-run holding of asset investment in the ROW would induce a higher production level in the ROW and would lower the world price through a decline of import demand for the U.S. product. Therefore, the supply schedule in the ROW become S_F-be under the devaluation of the U.S. dollar which derives a kinked import demand schedule confronted by the U.S. producers, i.e. ABK. The adjustment process through the over-valuation, devaluation, and short-run stickiness of asset investment would be from point a to b to c to d to e in the ROW market.[7] As a result, the world market equilibrium price is at P_w' and the traded amount is between OU and OU' as in Figure 1, i.e. $O\tilde{O}$. The rest of the world produces at OJ"'. The devaluation does improve the U.S. exports but not as much as that without the short-run holding of asset investment in the ROW. The U.S. produces at OF" instead of OF and consumes at OH" instead of OH. Finally, the ROW has consumption at OM" instead of OM due to the decline of the world market clearing price. These are in the short-run context. The long-run situation would depend more on the government policies in both economies. It is worth noting that the world market clearing price may fall further if the U.S. holds the target price policy. Also, the kinked import demand may

exist over time when devaluations of U.S. dollar or over-valuations of the ROW currency occur.

One other important factor for the international trade analysis is the change in the real sectors of either country. Figure 4 illustrates the effects on the international trade of a monetary expansion in the U.S..[8] Following from Figure 3, the world trade equilibrium point has fallen down from a to e in the world market. The U.S. monetary expansion would stimulate its aggregate demand from D_a to D_a'. The export supply curve in the world market has to shift from ES_a to ES_a''. The new world trade equilibrium is moving from e to f at world price level P_w'' and world trade level $O\tilde{U}'$ instead of $O\tilde{U}$. To the extent, the increase of the world price leads the U.S. consumption to $O\tilde{H}'$ instead of $O\tilde{H}$ and the U.S. production to $O\tilde{F}$. The ROW consumption would decline from OM'' to $O\tilde{M}$ but the Row production adjustment is not so clear. However, it is reasonable to argue that the production would increase at least from OJ''' to $O\tilde{J}$ in the short run. Moreover, the U.S. may loose its market share over time if the process of Figure 3 occur again. It is possible that the import demand curve becomes AB'''K''' instead of ABK. This implies a further loss of the U.S. share in the world market of $\tilde{U}'\tilde{U}''$.

If the ROW increases its aggregate demand at the same time, from D_r to D_r', the world market clearing price may move even higher relative to P_w''. Figure 5 illustrates the effects on the international trade of the increases in the U.S. and the ROW aggregate demands.[9] Following from Figure 4, the world market clearing price has moved up to P_w'' with the trade $O\tilde{U}'$ from the increased U.S. aggregate demand. The increase of the ROW

aggregate demand moves D_r to D_r' which shifts up the import demand curve ABK to A'B'K' in the world market. The world market price is then moving from f to g at a higher price level, $P_w"'$, relative to $P_w"$. The world price has moved to a record high level. As a result, the U.S. consumption becomes $O\tilde{H}"$ instead of $O\tilde{H}'$ and the production moves from $O\tilde{F}$ to $O\tilde{F}'$. The traded amount will move from $O\tilde{U}'$ to $O\tilde{U}"$ in the world market. The ROW consumption moves up from $O\tilde{M}$ to $O\tilde{M}'$ and the production increases at least from $O\tilde{J}$ to $O\tilde{J}'$.

It follows from Figure 1 to Figure 5, except 2, that the world market clearing price movements have the process from a to e to f to g with different assumptions. If Figure 2 is considered together with Figure 5, the world market clearing prices in the adjustment are lower than otherwise would be. Moreover, Figure 5 suggests that the world market clearing price would drop from $P_w"'$ to $P_w"$ but not to P_w' if the ROW aggregate demand moves back to D_r because of high world price. The world trade amount is affected not only by the changes in the real sectors but the changesof the exchange rates.

Finally, Figure 6 illustrates the effects of an over-valuation of the U.S. dollar on the international markets following from Figure 5. The world trade amount decreases from $O\tilde{U}"$ to $O\tilde{U}^*$ in the world market. Implicitly, the slopes of the export supply and the import demand are higher than before and are faced by the ROW and the U.S., respectively. As a result, the world market clearing price ,$P_w"'$, does not change. The U.S. production moves back from $O\tilde{F}'$ to $O\tilde{F}^*$ and the consumption increases from $O\tilde{H}"$ to $O\tilde{H}^*$. The production in the ROW moves from

$O\tilde{J}'$ to $O\tilde{J}^*$ which moves away from the effect of the kinked S_{-}. The high world price also depresses the consumption in the ROW from $O\tilde{M}'$ to $O\tilde{M}^*$.

Conclusions

The over-valuation of the U.S. dollar has decreased the share of U.S. goods in the world market. Yet, a devaluation of the dollar (figure 4) may not cause gain in the U.S. share of the world market over time. There may not exist a short run solution to improve U.S. exports. To this extent, the current U.S. agricultural loan rate policy may be in the right direction but may not effectively improve the future exports. If the loan rate declines below the world market price, the domestic problem of over production would be relaxed and the world market price may stay in equilibrium without any changes of the real sectors. The decrease in farm income in inevitable in the short run. Moreover, the problem of losing the market share still exists with the tendency of the over-valuation of the U.S. dollar. This analysis suggests that the U.S. may loose its share in the world market if foreign countries increase their asset investments over time. However, the effects of lowering the loan rate in the U.S. may depend on the opportunity costs of producing grain in both economies.

Figure 1. Illustration of the Effects in the International Trade of An Over-Valuation of the U.S. Dollar

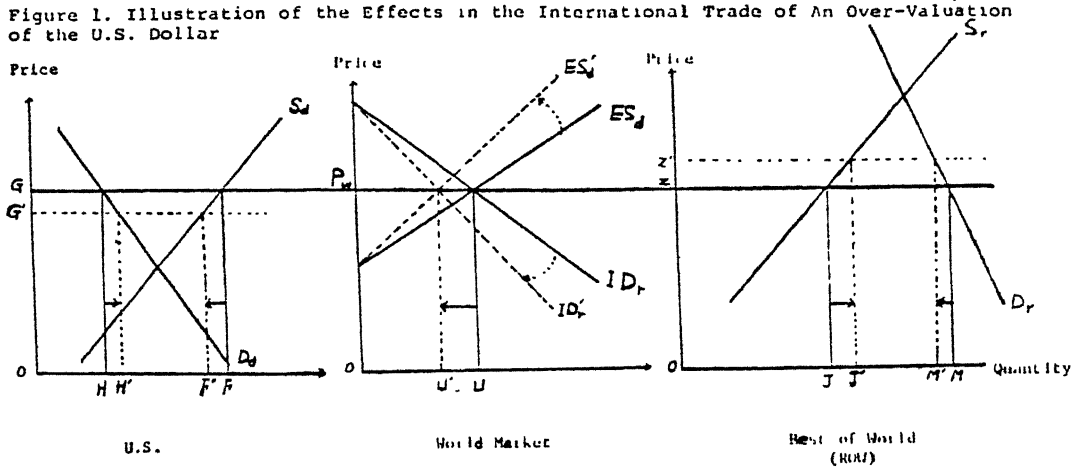


Figure 2. Illustration of the Effects in the International Trade of A Target Price Policy in the U.S. and An Over-Valuation of the U.S. Dollar

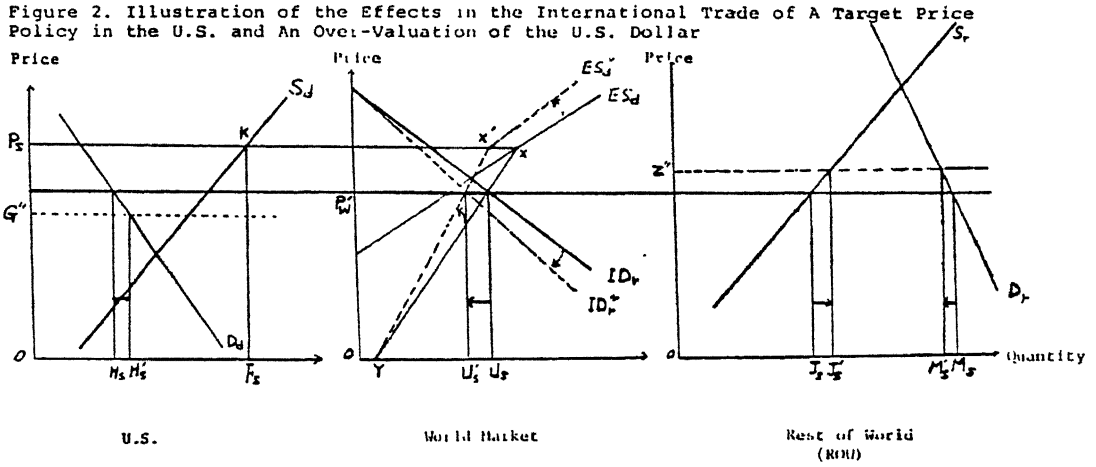


Figure 3. Illustration of the Effects in the International Trade of A Devaluation After the Over-Valuation Accompanied with A Short-Run Asset Holding in the ROW

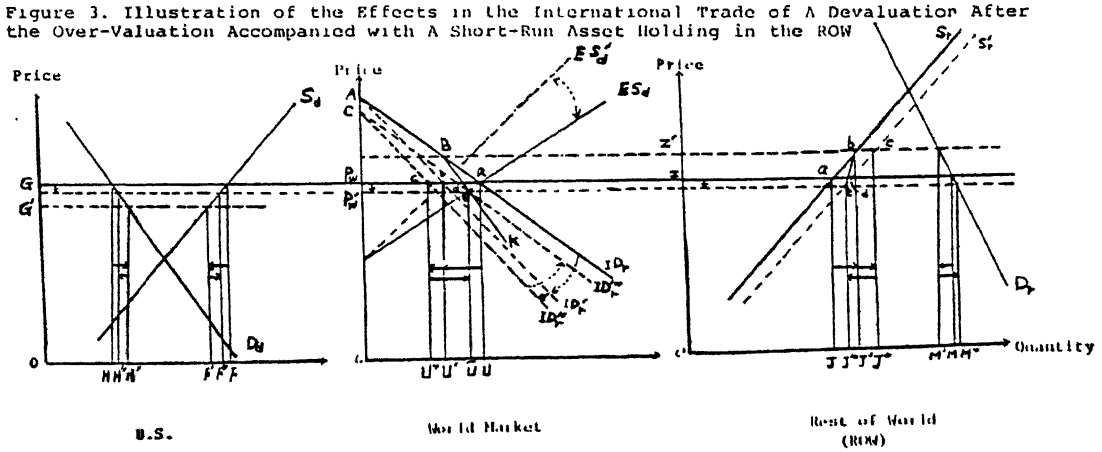


Figure 4. Illustration of the Effects in the International Trade of A Devaluation After the Over-Valuation Accompanied with A Monetary Expansion in the U.S.

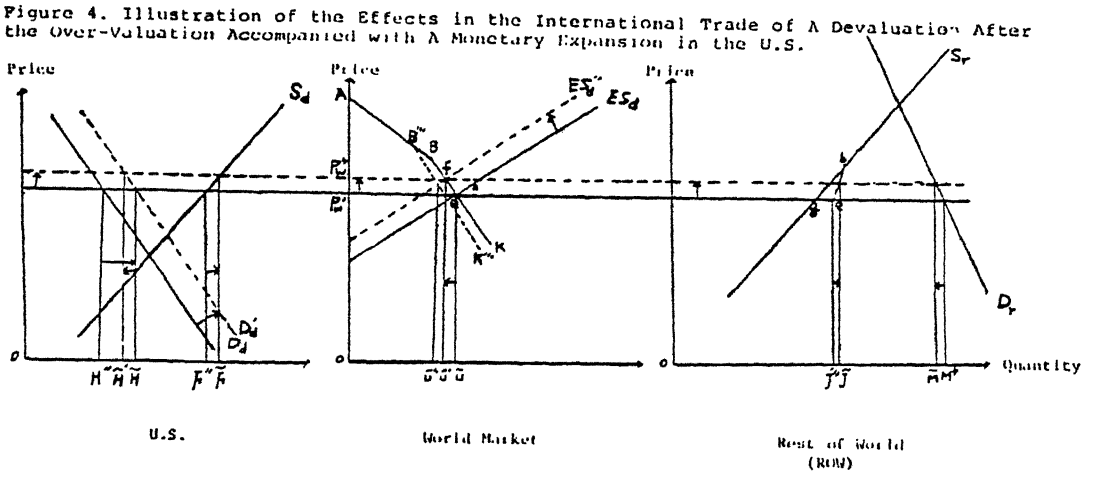


Figure 5. Illustration of the Effects in the International Trade of An Increase of Aggregate Demand in the ROW While Devaluation is Still in Effect

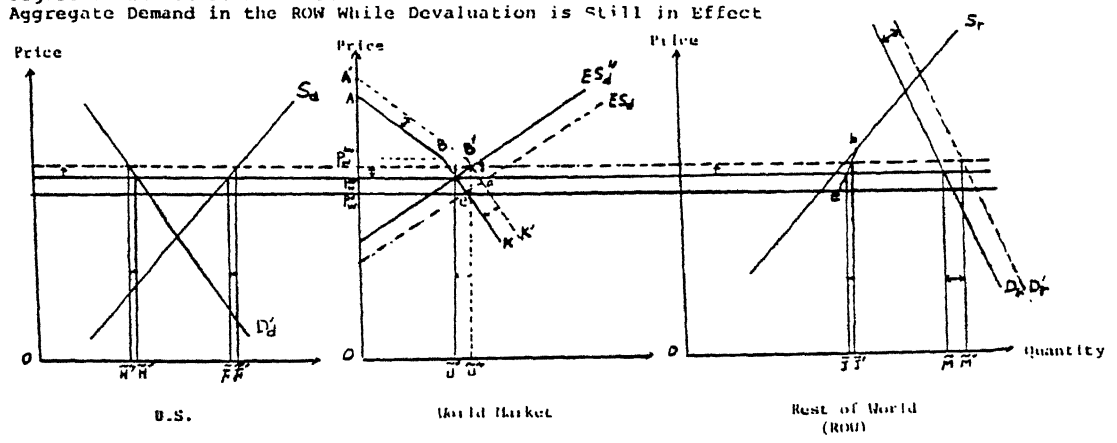
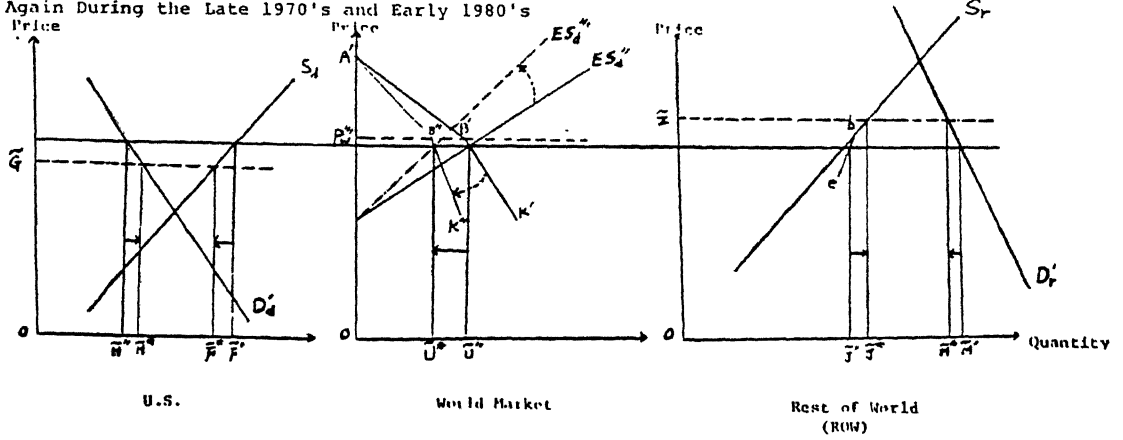


Figure 6. Illustration of the Effects in the International Trade of An Over-Valuation Again During the Late 1970's and Early 1980's



Endnotes

1/ They are the relationships between exchange rates and the agricultural trade; the relationships between money supply, or interest rates, and the agricultural trade; the tests of hypotheses about the neutrality of the money supply on the agricultural trade; and the international dimension of money as related to commodity prices and trade relationships.

2/ The major shocks are the changes in the exchange rate, the changes in the money supply, the changes in the world food production, and the changes in the export quantities. The exchange rate is treated as partially endogenous.

3/ For example, the U.S. production of grain might have comparative advantage over the ROW during 1960's and first half of 1970's because of lower opportunity costs than the ROW..

4/ It is equivalent to assume that the aggregate price indices between the two countries are the same. Following from the Purchasing-Power-Parity argument, the exchange rate can be defined as: $P = S * P^*$. Where P and P* represent the U.S. and the ROW aggregate price levels, respectively. S stands for the exchange rate in the world market.

5/ Schuh (1974) argues that the U.S. exchange rate may have been over-valued since 1952. Theoretically, Dornbusch (1976) and Frenkel(1976) provide explanations of the determinants of the exchange rate. They are the nature of the purchasing parity, the asset or the stock of money, and the role of expectations. Dornbusch argues further that the short-run overshooting is

possible in a case of price stickiness. In addition to the three factors, Mussa (1976) argues that the real national income is also important in the exchange rate and the balance of payment argument.

6/ The interpretation here is different from Schuh's paper.Schuh assumes that the U.S. confronts a very elastic import demand function of the ROW. The over-valuation raises the price of the product in terms of foreign currency, which reduces the demand for domestic product. Thus, the domestic price, G', in Figure 2. will be determined by the foreign market and by the long-run condition of supply in other country. However, the elasticities of the export supply and the import demand functions in the world market is allowed to be determined by the domestic excess supply and the ROW excess demand, respectively. This provides us a broader view in searching for the determinants of the world market framework than that in Schuh.

7/ If the ROW tried to improve its current account balance by using short-run devaluations over time, the import demand curve may not kink that much as in the case. However, the effects of a devaluation may be higher than in the case. It is the case like the Brazil in the 1960's and 1970's, see Williams and Thompson (1983).

8/ The U.S. experienced a monetary expansion during most of the 1970's and especially in the early 1980's, see Batten and Belongia (1983).

9/ For example, Brazil increases demand for soybean with the development of poultry industry in 1970's and of crushing.

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